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FEDERAL-GRANT RESEARCH
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U. S. DEPARTMENT OF AGRICULTURE

Projects on
FOOD SCIENCE AND TECHNOLOGY
Part 9, Section a
Food Chemistry, Microbiology, Sanitation and Public Health

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

Compiled March 1958 by

the State Experiment Stations Division, Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C., for use of workers in agricultural research in the subject-matter areas presented. For information on specific research projects write to the Director of the Station where the research is being conducted.

Issued May 1958

FEDERAL-GRANT RESEARCH

at the

STATE AGRICULTURAL EXPERIMENT STATIONS

Projects on

FOOD SCIENCE AND TECHNOLOGY

Section a: Food Chemistry, Microbiology,
Sanitation and Public Health

Contents

I. APPLIED FOOD CHEMISTRY .... Page 1
  Analysis and Composition.................................. 1
  Nutrition.. 4
  Enzymes.. 9
  Pigments and Color... 11
  Additives.. 12
  Physiological and Chemical Changes......................... 13
  Browning... 14

II. FOOD AND INDUSTRIAL MICROBIOLOGY......................... 14
  General.. 14
  Fermentations.. 16
  Microbiological Methods.................................... 16
  Microbial Spoilage... 17

III. FOOD SANITATION - PUBLIC HEALTH......................... 17
  General.. 17
  Water Supply... 18
  Building and Equipment..................................... 18

IV. LIST OF SUBJECT-MATTER AREA COMPILATIONS....... Attachment

INTRODUCTION

This compilation is one of a series providing information on State agricultural experiment station research supported by Federal-grant funds appropriated annually by Congress under authorization of the Hatch Act of 1887, as amended and approved Aug. 11, 1955, and Section 204(b) of the Agricultural Marketing Act of 1946. It is prepared for use by research workers in the subject-matter areas presented. Only that part of each State's research program supported by Federal-grant moneys is included.

In addition to the Federal-grant moneys, the State experiment stations receive some Federal support through cooperative agreements or contracts with the U. S. Department of Agriculture. Information on such research, along with other departmental research, is available in the Central Project Office, Agricultural Research Service.

A substantial part of each State agricultural experiment station's research is supported with moneys appropriated by the respective State or Territorial Legislatures and through other forms of private and public financing. Information on current agricultural research at the stations which is not financed under the Federal-grant program or through USDA cooperation can be obtained from experiment station directors.

The information given in the series of Federal-grant compilations includes the title and objectives of each Federal-grant project pertaining to the subject given on the cover. The identification of each project gives the department(s) conducting the research, the station number of the project, and the number of the regional project if it is a contributing project.

Relevant regional projects, if any, appear at the end of the compilation. States having projects contributing to regional projects are indicated. The Roman numeral (and capital letter) refer to the location in the summary of the contributing project title and objectives. The States are grouped into four major regions. These are designated NC-North Central, NE-Northeastern, S-Southern, and W-Western. The capital letter "M" following the letters for the region indicates regional marketing projects.

FOOD SCIENCE AND TECHNOLOGY, Section a

APPLIED FOOD CHEMISTRY

Analysis and Composition

Calif. The Chemical Constitution of Carbohydrates and the Mechanisms of their Formation and Breakdown. To obtain information on fundamental structure of the complex carbohydrates (chiefly of plant origin) and biochemical mechanisms through which they are formed and broken down. Carbohydrates to be included are: sucrose, starch, inulin, galactans, pentosans, seaweed polysaccharides, such as glucosan produced by crown-gall organism, etc.
Biochem. 666

Calif. Pectin in Relation to the Soluble and Insoluble Carbohydrates of Immature and Mature Citrus Fruits. To (1) study changes of pectin in relation to the soluble and insoluble carbohydrates of citrus fruits during growth and maturation, to understand more fully metabolic changes of the fruit in transit and storage; (2) study changes that occur in pectins of the peel of lemons during storage; and (3) determine physical and chemical properties of isolated pectins from mature citrus fruits in relation to their commercial values.
Plant Biochem. 1159

Colo. Isolation and Identification of the Polyphenols of Crop Plants and a Study of Their Properties and Biochemical Function. To (1) quantitatively estimate polyphenolic constituents of crop plants with reference to plant parts used for food; (2) separate and identify principal polyphenols of specific plant species and varieties; (3) study and consider properties of polyphenols separated and identified; and (4) establish various biochemical functions for polyphenols isolated.
Chem. 92 Coop. ARS

Hawaii The Sodium Content of Selected Fruits and Vegetables Grown in Hawaii. To determine variability of sodium content of some important fruits and vegetables in relation to area where grown and proximity to the ocean.
Home Econ. and Food Nutr. 521

Ind. The Liberation of Vitamins from Casein, Soybean, and Other Proteins. To study methods for liberation of vitamins from proteins to prepare vitamin-free proteins suitable for use as dietary proteins in test rations.
Biochem. 576

Ind. Genetic and Chemical Studies in the Breeding of Tomatoes for Higher Vitamin Content. To (1) develop improved red and orange varieties of tomatoes of high vitamin C and provitamin A content; (2) determine genetic basis of inheritance of various tomato fruit pigments and related colorless polyenes; and (3) clarify chemistry of tomato fruit pigments and related polyenes.
Biochem., Bot. and Plant Path. 738

Iowa Structural and Enzymic Studies on Carbohydrates. To (1) prepare homogeneous carbohydrates; (2) examine these from point of view of physical, chemical, and biochemical properties; (3) relate properties of these pure saccharides to corresponding properties of more complex saccharides, especially starch; (4) examine structure, chemistry, and biochemistry of complex saccharides, especially starch, by physical, chemical and biochemical methods; and (5) ascertain specificity and mode of action of carbohydrases.
Chem. 1116

Kans. Minor Carbohydrate Constituents of Sorghum Grains and Other Crops. To (1) obtain data on composition of hemicelluloses found in sorghum grains and other crops; and (2) identify and study role of water soluble carbohydrates found in cereal grains.
Chem. 530

Minn. The Fundamental Properties of Colloid Systems with Particular Reference to Biological Problems. 1. The Electrokinetic Properties of Interfaces. 2. The Properties of Matter in a State of Orientation (of Mono and Poly Molecular Films or Layers of Substances Oriented as a Result of Adsorption). 3. Solvation in Lyophilic Colloid Systems, the Factors Determining its Degree and the Extent of its Influence upon Other Properties (Viscosity, etc.) of such Systems. To study (1) fundamental laws governing colloid systems; and (2) properties of such systems under varied and determinable conditions.
Biochem. 1511 Coop. National Science Foundation

Nebr. Physico-Chemical Properties at the Molecular Level of Surfaces of Biologically Important Proteins Using Ovalbumin and Urease as the Principal Model Proteins. To (1) separate "pure" crystalline ovalbumin and urease into component fractions as per sedimentation and electrophoretic methods, and study physical properties of each of separated fractions; (2) compare number and availability of phosphate and sulfhydryl groups in each fraction; (3) study contribution of groups to the physical and chemical properties of the protein surface and to protein interactions; and (4) compare ovalbumins and ureases from various sources and other proteins as betalactoglobulin from milk and bovine serum albumin.
Biochem and Nutr. 591

N. J. A Study of the Formation of Pectic Substances. To furnish some information concerning the synthesis of pectic substances.
Plant Physiol. 505

N. Y. (State) The Identification of the Nitrogenous Constituents of Fruits and Vegetables in Relation to Maturity and Development of Quality for Processing. To study amino acids, peptides and related nitrogenous compounds occurring in plants, using primarily chromatographic techniques and to learn more about maturation and development of quality.
Home Econ., Food and Nutr., Veg., Agr. Econ. 4-b

N. Dak. Fatty Acid Composition of Linseed Oil from the World Collection of Flax Varieties. To find a flax variety producing a quick drying oil that is non-yellowing in paint and that has the following properties: High linoleic acid content, low linolenic acid content, low saturated and oleic acid content.
Agr. Chem. 2-5

Pa. Influence of Soils and Fertilizers on the Composition and Nutritive Values of Foods and Feeds. To study influence of nutritive conditions of plant growth on composition and nutritive values of agricultural products.
Agron., Dairy Sci., Anim. Nutr., Hort. 1019

Pa. Physical and Chemical Properties of Fats and Fatty Acid Derivatives in Relation to Their Composition, Structure and Utilization. To (1) develop and improve techniques for analysis of fats; (2) obtain more complete knowledge of structure and composition of various glycerides comprising each of the more common fats; (3) improve usefulness of fats by adding substances or removing others; (4) obtain more complete knowledge of physical and chemical characteristics of various fatty acid derivatives; and (5) study fat deterioration and factors influencing such spoilage.
Agr. and Biol. Chem. 1188

P. R. Chemical Composition and Nutritive Value of Coconut Oil and Defatted Cake. To study (1) chemical and physical characteristics of oil; (2) fatty acid composition of oil by distillation and other Procedures; (3) coefficient of digestibility of oil using rats; (4) composition of defatted cake; and (5) efficiency of protein in the defatted cake.
Biochem., Nutr. 119

Nutrition

Ala. Amino Acid Imbalances and Other Factors Affecting the Metabolism of Amino Acids in Microorganisms and Animals. To (1) produce amino acid imbalances in Lactobacilli and study underlying causes of such phenomena and means to prevent or correct the condition; (2) investigate with microorganisms possible relationships of vitamins, purines, pyrimidines, and minerals in metabolism of L and D forms of amino acids and related compounds; (3) develop experiments with laboratory animals similar to those with microorganisms to study amino acid imbalances and effects of nutrients on amino acid metabolism; and (4) determine relation of protein and amino acids, other than methionine, to development of fatty livers in rat and mouse.

Anim. Husb. and Nutr. 206

Ariz. Physiological Availability of Amino Acids and Other Nutrients in Foods and Feeds. To study physiological availability of amino acids in cereal grains and other foods or feeds.

Agr. Biochem., Agron. 258-A

Ariz. The Nutritive Values of Southwestern Produced Feeds and Factors Affecting These Nutritive Values. To study nature and activity of growth stimulating factors in honey and the various toxic factors in cottonseed meal.

Agr. Biochem., Poultry Sci. 258-C

Ariz. The Influence of the Interrelationship of Food Factors upon Physiological Utilization of Carotene and Vitamin A. To study effects of different proteins, carbohydrates and other food factors on use of carotene or vitamin A and how these effects are produced.

Agr. Biochem. 271

Ark. Nutritional Improvement of Rice and Rice Diets. To study (1) effect of replacing some of protein in brown, milled, enriched, parboiled, and converted rice with proteins of animal and vegetable origin and effect of additional proteins; (2) availability of amino acids of proteins of rice and its by-products; (3) effect of germination of rice on proteins, amino acid, and vitamin content and compare results obtained with those obtained in germination of oats; and (4) to conduct breeding experiments with rice to produce a strain with higher protein content.

Agr. Chem. 101 Coop. ARS

Ark. Improving Protein Efficiency of Cereal Grains with Amino Acids. To improve quality of proteins of plant foods such as cereal grains by adding amino acids which are deficient.

Agr. Chem. 355

Ark. The Biological Value of the Proteins in Different Cuts of Chicken Meat and in Chicken Organs. To (1) determine biological value of proteins in white and dark meats of chicken muscle and neck meats in friers, broilers, and hens; also in livers, gizzards, hearts, and lungs, as to growth, reproduction, and lactation; and (2) reinvestigate value of proteins in chicken muscle meats, beef, pork, lamb and veal.
Agr. Chem. 418

Ark. Nutritive Value of Fish Proteins for Growth, Reproduction and Lactation and Their Supplementary Value to the Proteins in Cereal Grains. To stimulate increased consumption of fish in the south, so as to supplement protein and vitamin intake.
Agr. Chem. 462

Calif. Relation of Food Intake to Tissue and Serum Cholesterol. To (1) test and evaluate a micro-cholesterol method - results to be made available to other stations; and (2) study extent to which variation of total food intake will alter cholesterol content of serum and certain tissues in cholesterol-fed and control laboratory animals.
Home Econ. 1644 (W-44) (See Part 13, Section a)

Colo. A Study of the Mechanisms of Metabolic Reactions as Influenced by Minor Constituents or Chemical Additives in Feeds or Foods. To investigate metabolic reactions of selected microorganisms, especially E. Coli, as affected by certain chemical additives and minor food constituents used in nutrition.
Chem. 87

Fla. The Nutritive Value and Storage Characteristics of Cobalt-60 Irradiated Foods and Feeds. Develop techniques for maintaining the nutritive value and palatability and extending storage period of foods and feeds preserved by irradiation with Co-60 at pasteurization and sterilization levels.
Anim. Husb. and Nutr., Food Tech. and Nutr. 849

Hawaii A Study of the Nutritive Value of Foodstuffs in Hawaii by Means of Chemical Analyses, Microbiological Assays and Biological Experiments. To (1) assemble data on the chemical composition and nutritive values of foods used locally in order that such data may be used in evaluating the diets of various groups or individuals in Hawaii and permit comparisons with foods used and/or analyzed elsewhere; (2) furnish data as needed on local foods used for poultry and other farm animals; (3) make other occasional food analyses as requested.
Nutr. 501

Ill. Evaluation of the Concept of Biological Value of Protein for Growth and Maintenance. To determine (1) relationship between protein quality and percentage of protein in diet required to produce maximum gain at different levels of intake of protein and of energy; and (2) relationships between biological value of protein, protein concentration in diet, and energy intake.
Anim. Sci. 20-306

Ill. Effect of Heat on Nutritive Value of High Fat Processed Foods. To (1) evaluate nutritive value of high fat foods, those which are prepared by deep fat frying and those normally prepared by other cooking procedures; (2) determine chemical changes in the fat, protein, and carbohydrate fractions of various products in order to correlate changes with any nutritive changes observed.
Food Tech. 50-396

Ill. Conservation of Nutritive Value of Food. To (1) determine losses incurred in vitamins, primarily ascorbic acid and riboflavin, in a considerable number of vegetables and fruits at selected stages from harvest to time of consumption; and (2) compare effects of 2 to 5 common cooking methods on amounts of nutrients (fat, protein, B-vitamins, and essential minerals) in a few cuts of meat.
Home Econ. 60-321

Ill. Proteins in Human Nutrition. To study (1) the biological value of proteins; and (2) the interrelationships between caloric intake and nitrogen metabolism.
Home Econ. 60-334

Ill. Nutritive Requirements of Humans. To determine, by means of balance studies on human subjects, their requirements for various food nutrients; and to investigate the influence of the amount and quality of protein consumed by college women on their riboflavin and niacin requirements.
Home Econ. 60-335

Iowa Amino Acids in Nutrition. To (1) study metabolism of N in protein-depleted rats through urine, tissue, and blood analyses, and to relate findings to those occurring when these variables are applied singly and in combination; (2) study various sources and amounts of N added to basal low fat-low N diet, (b) various sources of calories used in basal low N diet, (c) caloric intake restricted, (d) insulin and possibly other "regulators" of enzyme activity responsible for maintenance and efficiency of certain metabolic reactions; and (3) find if information obtained from protein-depleted animals applies to well-nourished animals.
Home Econ. 995

Minn. Preparation and Preservation Factors in Relation to the Nutritive Value and Palatability of Meat. 1. The Effect of Different Methods of Cooking upon the Nutritive Value of Meat. To determine the effect of different methods of cooking, and the effect of reheating, upon the vitamin content of meat. 2. The Effect of Freezing Storage Upon the Quality of Meat.
Home Econ. 2003, -1, -2

Minn. Nutritive Value, Quality, and Utilization of Minnesota Fruits and Vegetables. 1. A Study of the Changes in Nutritive Value and Quality which take Place in Fruits and Vegetables During Home Cooking. 2. Testing the Quality of Minnesota Fruits for Culinary Uses. 1. To determine (1) the effect of different methods of home cooking (boiling, steaming, pressure sauce pan) on vitamin C, Ca and P content of 2 varieties each of cabbage, green beans, sweet corn , squash and rutabagas; and on the color of cabbage and green beans;(2) the effect of methods of preparing for cooking (shredding and cutting in different ways) on same nutrients in cabbage, green beans, and carrots from market sources; and on color of cabbage; (3) details for determination (in 1943) of riboflavin, thiamin and iron. 2. To continue quality tests of Minnesota fruits.
Home Econ. 2004

Minn. The Nutritive Value and Quality as Determined by Objective Tests of Frozen Fruits and Vegetables. To study (1) the ascorbic acid and dehydro-ascorbic acid changes caused in fruits and vegetables by methods of preparation for freezing and of freezing storage being recommended by the station;and (2) color, texture, and any other quality factors possible by objective tests in fruits and vegetables frozen and stored by the methods referred to in (1). (3) To use measurements in (1) and (2) as guides in working out better methods for the freezing and freezing-storage of fruits and vegetables.
Home Econ. 2011

Miss. The Effects of Varieties, Curing, and Baking Time Upon the Carbohydrate Content of Baked Sweet Potatoes. To determine (1) rate of enzymatic inactivation and effect of heat on firmness, texture, moisture, and nutritive content of baked sweet potatoes; (2) effects of curing 7 and 14 days prior to baking on sugars, alcohol insoluble solids, and moisture content of baked roots; (3) amylose and amylopectin content of starch found in raw and baked roots and their relation to firmness, texture, and moisture.
Hort. HK-12, Chem. HF-4

Miss. Qualitative Studies of the Yield and Nutritive Value of Southern Peas. To determine (1) highest yielding varieties of southern peas; (2) relative starch, sugar, and vitamin C content of better adapted varieties; and (3) factors which affect processing quality of southern peas.
Hort. HK-16

Mont. The Comparative Value of Common Grain Combinations in Poultry Feeding. I. For Palatability and Nutritive Value of Broilers and Turkeys Finished for Market. To determine comparative value of corn, wheat, oats and barley combinations in finishing broilers and turkeys for market.
Poultry Ind. M.S. 812, Home Econ. 26

Mont. The Comparative Value of Common Grain Combinations in Poultry Feeding. II. For Quality, Palatability and Nutritive Value of Market Eggs. To determine comparative value of corn, wheat, oats and barley on cooking qualities and palatability and nutritive value of market eggs.
Home Econ. 27, M.S. 813

N. Mex. Biological Utilization of the Amino Acids in the Protein of Pinto Beans. To determine (1) biological use of amino acids of protein of pinto beans; and (2) effect of changing relative amounts of amino acids and/or other dietary factors on use of amino acids of beans.
Home Econ. 82

N. C. The Effects of Environment, Curing and Storage on the Carotene and Ascorbic Acid Content of Several Varieties of Sweet Potatoes. To study effects of variety and seed source, field arrangement, soil sampling, time and methods of planting, meteorological data, and time and methods of harvesting, curing and storage procedures.
Hort. H-84 Coop. USDA

Pa. A Study of Inherent Factors in Fruits and Vegetables which Affect Conservation and Maintenance of Nutritive Value in Foods. To investigate role of chemical entities known to have inhibiting or accelerating action on destruction of nutrients identify factors in plant tissue which protect nutritive value and affect retention, investigate enzyme systems and determine predominant systems and means of stabilizing and/or destroying them.
Home Econ. 1093

S. C. Food Value and Utilization of Sesame Meal. To (1) determine vitamin content and general composition of sesame meals produced in various ways; (2) develop new recipes in which sesame meal is incorporated; and (3) determine desirability of incorporating sesame meal into bread and other foodstuffs.
Nutr. 67

S. Dak. A Study of the Nutritive Value and Use of South Dakota Grown Fruits and Vegetables. To (1) study nutritive value, especially vitamin content, of different varieties of fruits and vegetables grown in South Dakota; and (2) develop new ways of using less well known fruits and vegetables which grow wild or can be cultivated in home or commercial gardens.
Home Econ. 210

W. Va. The Influence of Autoxidized Fat in the Diet on Protein Requirements. (1) Under controlled dietary conditions note effect of rancid fat in complete diet on use of proteins as measured by weight gains, efficiency of food use and N retention. (2) Study changes in gastro-intestinal tract, produced by rancid fat in diet which might influence amino acid absorption. (3) Determine effect of individual amino acids given as supplements to experimental diet containing rancid fat.
Agr. Biochem. and Nutr., Home Econ. 118 (NE-37)(See Part 13, Section a)

Wis. The Vitamin Content and Cooking Quality of Potatoes. To determine (1) distribution of the vitamin in different parts of the tuber; (2) differences due to variety; (3) effect of storage conditions and of various processes of food preparation on concentration of the vitamins in potatoes; and (4) influence of various factors on their cooking quality.
Home Econ., Genet. 671

Enzymes

Calif. Pectic Enzymes of Fungi. To determine role of yeasts and other fungi in hydrolytic breakdown of pectic substances, surveying representative species of yeasts as to their ability to form enzymes capable of causing degradation of pectic substances, and when enzyme activity is formed, investigate the mechanism of its actions on pectic substances.
Food Tech. 1522

Del. Non-Cellulosic Constituents of Plant Cell Walls. Study composition of plant cell walls with special reference to non-cellulosic constituents.
Agr. Chem. 25C

Ind. In Vitro Hydrolysis of Proteins by Enzymes. To (1) determine rate and extent of digestion of proteins in feed ingredients and mixed feed using various modifications of an *in vitro* enzymatic colorimetric method; and (2) compare values obtained above with *in vivo* digestion coefficients obtained on same samples of feed in rats and with protein digestion coefficients of these feeds published for farm animals.
Biochem. 413

Kans. Enzymatic Separation Applied to the Determination of Collagen in Meat. To determine effectiveness of certain proteolytic enzyme preparations in releasing collagen from combination association, or entanglement with contiguous muscle protein structures.
Home Econ., Chem. 419

Nebr. Enzymes of Wheat and Flour and Their Relation to Baking Characteristics. To study (1) methods for identification and estimation of flour enzymes; and (2) their relation to flour properties.
Biochem. and Nutr. 184

Nebr. Naturally Occurring Enzyme Inhibitors and Their Nutritional Significance. To study (1) occurrence of enzyme inhibitors in natural feedstuffs; (2) mode of action of such inhibitors; (3) their nutritional significance; and (4) means for counteracting effects of these inhibitors.
Agr. Chem. and Nutr. 308

Nebr. Enzymatic Synthesis and Structural Characterization of Carbohydrates. To investigate (1) biosynthesis of lactose in mammary gland; (2) enzymatic synthesis and structure of galactosyl oligosaccharides in plants; (3) pathways of synthesis of galactosyl oligosaccharides in plants; and (4) mechanism of synthesis and deposition of starch in plants.
Biochem. and Nutr. 448 Coop. National Science Foundation

N. Y.
(Cornell) The Oxidizing Enzyme Systems in the White Potato. To (1) study relationships between oxidative enzymes of potatoes and potato discolorations; (2) study location of such enzymes, their substrates, and inhibition; and (3) determine interrelationships of maturity of potatoes, degree of discoloration, and oxidative enzyme systems.
Veg. Crops, Food and Nutr. 110

N. Y.
(State) Chemistry of Pectin and Pectic Enzymes. The mechanisms by which the pectic constituents of fruits change are unknown. Information is sought (1) on the mechanism of pectic transformation in fruits in vivo; (2) on the mechanism of the known pectic changes which occur when fruit tissues are macerated as in the manufacture of many food products.
Food Sci. and Tech. 2a

N. Y.
(State) Relation Between the Presence of Oxidizing Enzymes and Keeping Qualities of Frozen Fruits and Vegetables. To determine presence of certain enzymes in fresh and processed plant materials and bearing of these enzymes on blanching requirement and keeping qualities of processed fruits and vegetables.
Food Sci. and Tech. 2b

Oreg. Enzymatic Reactions and Effects in Frozen Foods. To (1) develop new simple tests for enzyme activity in fruit and vegetable tissue to enable frozen food plant operators to determine more accurately vegetable blanching procedures and control browning in fruits; (2) determine quantities of known enzymes and speed enxyme accumulation or loss in harvested fruits and vegetables to more fully understand problems of control; (3) develop new blanching techniques for processing frozen vegetables and new methods for controlling browning reaction in frozen fruits; and (4) determine enzymes in fruits and vegetables most commonly frozen in commerce, and investigate specific reactions causing deterioration of frozen products resulting in off-flavor, odor and color.
Agr. Chem. 146

Pa. The Effect of Mutation on Bacterial Enzymes. To determine effect of induced genetic change on enzymes.
Bact. 1165

Pa. Determination of Oxidative Enzyme Systems and Oxidative Pathways in Higher Plants. To (1) develop and improve techniques for detecting presence and measuring the activity of oxidative enzymes; (2) determine presence and activity of oxidative enzymes in higher plants; and (3) relate presence of oxidative enzymes to metabolic pathways in higher plants.
Agr. and Biochem. 1218

P. R. Enzymes of Tropical Fruits and Their Bearing on Processing Problems. (1) Identify proteolytic, pectolytic, oxidizing, and other enzymes present in fruits; (2) Make purified preparations of identified enzymes and study properties, optimum conditions for action, and their pH salt and temperature effects; (3) Determine substrates on which enzymes act and their distribution in different parts of fruits; (4) Determine how enzymes in tissues are affected by maturity, growing conditions and varietal differences; (5) Study inactivation temperatures of enzymes and effectiveness of heat-processing techniques; (6) Relate changes in color, texture, etc., taking place during processing and storage with properties of studied enzymes.
Food Tech. 110

Pigments and Color

Calif. Pigmentation in the Tomato and the Color of Processed Tomato Packs Including Solid Pack, Stewed Tomato, Juice, Paste, and Catsups. To (1) control nature and quantity of natural pigments of tomato; and (2) evaluate results in terms of color of processed product, and determine factors controlling grade of final product.
Food Tech., Genetics, Agron., Veg. 1545

Ind. A Unit Color and Defect System for Purchasing Cannery Tomatoes. To determine applicability of Purdue Sampling Table and Purdue Color Meter to improvement of precision in assigning U. S. grades to tomatoes for processing; (2) to establish a unit of color and a unit of defect, and using them, develop a method to buy and sell tomatoes on unit color and defect system; (3) ascertain advantages to grower and canner by such a system of pricing tomatoes; and (4) make improvements possible in devices used.
Hort. 710

Mo. Investigation of the Changes in Meat Pigments under Various Treatments. (1) Study photometrically the changes in meat pigments when piece meats are treated with antioxidants including sulphur containing protein derivatives. (2) Study effects of various acceptable additives on meat pigments and palatability of meats. (3) Develop and evaluate a simplified spectrophotometric method for learning condition of meat pigments and for detecting use of certain "color preservatives."
Home Econ. 87

N. Y. (State) Factors Involved in Darkening of Sauerkraut. To determine causes of darkening of color and development of certain off flavors in saurkraut and to define these qualities on an objective basis.
Food Sci. and Tech. 3d

S. C. The Causes and Prevention of Discoloration in Stored Pungent and Paprika Peppers. To (1) develop a quick test to predict color stability on aging; (2) develop a practical method of preventing discoloration of cayenne pepper and paprika.
Agr. Chem. 45

Additives

Kans. Factors Influencing the Magnitude, Character and Persistence of Organic Phosphorus Insecticide Residues on or in Food and Forage Crops. Isolate, define, and evaluate the factors influencing the magnitude and/or persistence of organic phosphorus insecticide residues on or in plants and animals.
Ent. 481 (NC-33) (See Part 7, Section d)

Mass. Antioxidants of Cacao Origin for Dairy Products. To (1) evaluate antioxidant activity in butterfat of cacao shell and cocoa powder; (2) evaluate antioxidant activity in butterfat of various fractions obtained from cacao shell and cocoa powder; (3) isolate, identify, and further evaluate individual substances from cacao which appear to be potentially useful as antioxidants in dairy products; and (4) find better chemical methods as guides to detect onset of oxidative deterioration in butterfat.
Dairy and Anim. Sci. 32

Physiological and Chemical Changes

Calif. The Catalysis and Inhibition of Fat Oxidation at Low Temperature. To (1) measure rate of catalysis of unsaturated fat oxidation at low temperature by home compounds like hemin, hemoglobin, and cytochromes and by enzymes; (2) determine relative effect of various antioxidant inhibitors; and (3) from the investigations, formulate mechanisms of catalysis and inhibition.
Food Tech. 1506

Md. Changes in Chemical Composition of the Sweet Potato During Development, Storage, and Processing as Related to Quality of the Final Product. To determine (1) biochemical and chemical changes in composition of potato during development of fleshy root, during curing and storage, and after preparation for consumption by canning and baking; (2) varietal differences in composition and to relate such differences to storage behavior and to quality of canned and baked product.
Hort. Q-79-g

N. J. Inhibition of Softening of Fresh Foods. Use chemical microscopy, optical and electron, to see if these techniques are capable of determining why foods soften.
Food Tech. 277

N. J. The Decomposability of Tannins and Tannin Complexes. (1) Determine decomposability of complex of tannins and other organic materials. (2) Compare decomposability of complexes with that of the tannins and other organic materials separately. (3) Determine influence of reaction (pH) and other environmental factors on decomposition of organic materials. (4) Determine decomposability in solution culture media in solid vehicles as sand.
Agr. Microbiol. 403

N.J. Fertilizing, Varietal and Cultural Factors Influencing the Cooking, Chipping and Freezing Quality of Potatoes. Determine effect of following factors on potato chips, French fries, and table quality: sulfate of potash vs. muriate of potash; various fertilizer formula and rates; varieties; cultural factors as: planting depth, planting and harvesting dates, use of irrigation, applications of fungicides and insecticides, methods and time of vine killing, sprout inhibitors, storage conditions.
Plant Path. 483

Browning

Calif. *Nonenzymatic Browning in Foodstuffs.* To study nonenzymatic browning of foodstuffs with emphasis on reactants and mechanism whereby numerous reaction products are formed.
Food Tech. 1111 Coop. USDA

FOOD AND INDUSTRIAL MICROBIOLOGY

General

Calif. *Metabolism and Industrial Application of Fermentation Microorganisms.* To investigate (1) taxonomy and metabolism of yeasts from California grapes and overseas sources; (2) taxonomy and metabolism of certain fermentative bacteria and molds of importance in food industries; and (3) adaptability to and utilization of such microorganisms under industrial conditions.
Food Tech. 1109

Idaho *Carotenoid Pigment Production and Nutritional Requirements of Certain Gram Negative Bacteria Isolated from Soil and Water.* To (1) study carotenoid pigments of *Flavobacterium* species by qualitative and quantitative procedures, and investigate influence of cultural conditions on pigment formation; (2) define nutritional needs of certain of soil and water bacteria used in investigations of pigmentation; (3) determine suitability of carotenoid pigmentation to serve as a property useful in arranging species of *Flavobacterium* and related pigmented, Gram negative plant pathogenic and soil bacteria.
Bact. 341

Ill. *A Study of Various Factors Affecting the Thermal Resistance of Bacterial Endospores.* To evaluate and determine conditions which affect the thermal resistance of bacterial endospores with particular emphasis on endospores produced by bacteria of importance in spoilage of thermally produced foods.
Food Tech. 50-376

Maine *Factors Affecting the Shelf-Life of Pre-Cut Packaged Poultry.* To study (1) role of microbiological populations and their relation to the storage life of pre-cut packaged poultry; (2) effect of antibiotics and in plant chlorination on this problem; (3) effect of container and over-wrap on odor and deterioration of packaged product.
Food Processing, Engin., Poultry 98

Mass. *Thermal Destruction of Bacterial Spores and Heat Labile Vitamins in the Temperature Range of 250 to 300° F.* To study destruction rates, factors which influence destruction of bacterial spores, and heat labile vitamins at temperatures of 250 to 300° F.
Agr. Engin. 48

Mich. *Thermal Resistance of Vegetative Cells and Spores of Microorganisms*. (1) Design an apparatus to accurately control processing of food spoilage microorganisms by wet steam, superheated steam, and hot, dry gases. (2) Obtain reliable data on resistance of food spoilage microorganisms to wet steam, and superheated steam. (3) Explain differences in thermal resistance of microorganisms to dry and wet heat.
Agr. Engin. 830

Miss. *The Vitamin Content of Azotobacter Vinelandii*. To assay content of riboflavin, thiamine, niacin, biotin, pantothenic acid, and vitamin B_{12} in *Azotobacter vinelandii* in fresh and stored preparations.
Home Econ. HJ-1

N. C. *Growth Stimulants for Certain Lactic Acid Bacteria*. To (1) study purification, isolation, and characterization of growth stimulants occurring in certain plant and animal tissue; (2) determine role of stimulants in bacterial nutrition; (3) study methods for use of purified stimulants in commercial fermentations involving manufacture of cultured buttermilk, cottage cheese, ripened cheeses.
Anim. Indus. H-30

N. C. *Factors Influencing the Biosynthesis of Carotenoids by Yeasts*. To (1) identify and characterize carotenoid pigments produced by species of yeast in genera *Rhodotorula*, *Torulopsis*, *Cryptococcus* and related genera; (2) determine influence of cultural conditions on carotenoid production by yeasts in these genera.
Chem. H-41 Coop. ARS, U. S. Food Fermentation Laboratory

Pa. *Oxidative Metabolism of Bacteria*. To (1) determine metabolic reactions by which bacteria oxidize carbohydrate to completion; (2) relate oxidative metabolism of bacteria to reactions by which energy is trapped and synthetic C skeletons are formed; (3) determine relationship between oxidative metabolism and photometabolism in photosynthetic bacteria.
Bact. 1265

P. R. *Identification and Thermal-Death-Time Studies on the Natural Flora of Puerto Rican Fruits and Vegetables*. To (1) identify the flora normally found in locally-produced tropical fruits and vegetables when they reach the processing plant and at various stages of their processing and storage; (2)determine thermal resistance of organisms found in locally-produced fruits and vegetables; (3) determine if the processing temperatures and duration of thermal treatments in the preparation of above-mentioned products are justified, from point of view of bacterial control.
Food Tech. 108

W. Va. The Nutrition of Fungi and Bacteria with Especial Reference to Substances which Induce, Stimulate, or Inhibit Growth and Reproduction. To (1) study exact nutritional requirements and metabolic processes of various fungi and bacteria; (2) isolate, identify and test chemical substances required for growth and reproduction, and study mechanisms of inhibition of life processes; (3) utilize fungi and other microorganisms for qualitative and quantitative assay of substances of physiological activity; and (5) study inheritance of certain physiological characters in fungi.
Plant Path. 28

Fermentations

Mass. Attempts to Improve the Efficiency of Farm and Commercial Vinegar Making Methods. Determination of Optimum Conditions for the Conversion of Alcohol to Acetic Acid by Acetobacter. To study the nutritive and environmental requirements of the Acetobacter for the efficient production of vinegar (acetic acid) from ethyl alcohol and fermented cider.
Bact. 15

Va. Vinegar Production by the Submerged Fermentation Process. Determine (1) yield and speed of vinegar fermentation from apple cider for several of acetifying bacteria; (2) effect of added bacteria nutrients to apple cider for increasing yield of acetic acid and speed of fermentation. (3) Compare apple varieties as to their suitability for vinegar production by submerged fermentation process.
Hort. 86088

Microbiological Methods

Idaho A Microbiological Assay for Unidentified Growth Factors Required by Chicks and Poults. To (1) prepare workable assay for an unidentified growth factor(s) required by chicks and poults, using microorganisms the growth of which responds to this same factor(s); (2) determine quantity of unidentified growth factor(s) in natural products or refined natural products using assay method; (3) use assay in investigation of place of growth factor in metabolism of microorganism used; and (4) study role of unknown growth factor in general metabolism.
Agr. Chem., Bact. 207

Ky. Microbiological Techniques in the Determination of Rancidity in Pork Fat. (1) Isolate organisms sensitive to components of rancid fat. (2) Develop a more rapid, accurate method for assaying rendered pork fat for rancidity. (3) Learn components of rancid fat acting as inhibitors of spore germination.
Anim. Husb. 265

Microbial Spoilage

N. Y. (Cornell) *The Effect on Bacterial Counts of Holding, Refrigerating and Freezing Cooked Foods Prepared in Quantity*. To study cooling rates and carry out bacterial analysis of and counts on cooked foods prepared in quantity held at room temperature and then stored under refrigeration or in the freezer, with a view to offering recommendations for the holding and storage of large quantities of foods prepared for institution food service.

Institution Mgt., Dairy Ind. 115

Tex. *Biochemical Characteristics of Heat and Chemically Injured Psychrophilic Bacteria*. To study (1) effect of cellular injury as caused by sub-lethal treatments with heat, alcohol, chlorine, and quaternary ammonium compounds on nutritional requirements of predominant types of psychrophilic bacteria; (2) effect of cellular injury by same agents on carbohydrate and N metabolism of psychrophiles, and biochemical properties of these cells as formation of proteolytic and lipolytic enzymes; (3) mode of action of injurious agents in inactivation process; (4) nature of restoration of viability by key intermediates as sodium pyruvates and citrates.

Dairy Sci. 1055

FOOD SANITATION - PUBLIC HEALTH

General

Mass. *Germicidal Agents for Agricultural Use*. To investigate germicidal properties of any new chemical agents which look promising.

Dairy and Anim. Sci. 31

Utah *The Effects of Residues of Newer Insecticides on Health*. To determine (1) under controlled conditions if insecticide residues appear on human foods of animal origin in toxic quantities when farm animals consume feeds containing residues of Endrin, Heptachlor and other new insecticides; (2) effects of residues on calves fed milk from cows which have been fed insecticide hay and when fed known amounts of insecticides mixed with feed; and (3) histological changes in tissues of various species of animal when fed different insecticides.

Anim. Husb., Chem. 424 Coop. National Inst. of Health

Water Supply

Mont. The Use of Water Softeners in the Blanching Process for Vegetables Preserved by Freezing. To determine (1) effect on flavor, texture, and appearance of frozen vegetables when waters varying in degree of hardness are used for blanching and rinsing; (2) improvement in flavor, texture, and appearance of vegetables when waters softened by several methods are used; (3) effect of varying concentration of water softening agents in blanch water only on flavor, texture, and appearance of vegetables.

Home Econ. MS 985

N. Mex. Influence of Water Hardness on the Detergent Action of Dairy Cleaners. To determine (1) influence of hard waters on effectiveness of chemical detergents commonly used in dairy cleaners; (2) combinations of detergent and water softening agents most effective for cleaning dairy equipment in hard water; and (3) influence of mineral waters on milkstone formation in dairy equipment.

Dairy Husb. 15

Building and Equipment

Ind. Insect and Related Problems in Food Processing Plants, with Special Reference to Tomato Canneries. To (1) determine species of insects constituting problems in and about plants, and factors contributing to intensity of occurrence; (2) develop improved methods of control measures for protection of foods from harvest thru to finished product; (3) study methods of reducing residue hazards resulting from application of insecticides; and (4) discover improved methods for control of obnoxious insects developing in waste products of processing.

Hort. Ent. 929

Mich. Creamery and Milk Plant Sanitation. To make bacteriological studies of dairy plant procedures and processes to determine their influence on quality, bacteria count, and safety of milk and dairy products.

Microbiol. 3

LIST OF COMPILATIONS OF FEDERAL-GRANT RESEARCH PROJECTS AT STATE AGRICULTURAL EXPERIMENT STATIONS

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
1	Agricultural Chemistry	Agricultural Chemistry
2	Agricultural Economics	a. Prices, Incomes, & General Studies of Commodities & Industries b. Farm Management c. Land Economics d. Farm Finance & Taxation
3	Agricultural Engineering	a. Land & Water Use & Development b. Power Machinery & Equipment c. Farm Structures & Materials
4	Animal Husbandry	a. Beef Cattle b. Sheep & Goats c. Swine
5	Dairy Husbandry	Dairy Cattle
6	Dairy Technology	Dairy Technology
7	Entomology & Economic Zoology	a. Field Crop Insects b. Fruit, Nut & Vegetable Insects c. Miscellaneous Insects & Economic Zoology d. Insecticides
8	Field Crops	a. Cereal Crops b. Oil, Fiber, Tobacco & Sugar Crops
9	Food Science & Technology	a. Food Chemistry, Microbiology, Sanitation & Public Health b. Food Engineering, Processing, Product and Process Development, Utilization and Waste Disposal c. Food Quality & Standards, Acceptance, Preference, & Marketing
10	Forage Crops, Pastures & Ranges	Forage Crops, Pastures & Ranges
11	Forestry	Forestry

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
12	Fruits & Nuts	Fruits & Nuts
13	Home Economics	a. Human Nutrition b. Housing c. Clothing & Textiles d. Foods-Consumer Quality & Utilization e. Household Economics & Management
14	Economics of Marketing	a. Field Crops b. Fruits & Vegetables c. Livestock, Meats & Wool d. Dairy Products e. Poultry & Poultry Products f. Forest Products & Ornamental & Drug Plants g. Cross-Commodity & Functional Studies
15	Meteorology	Meteorology
16	Ornamental & Drug Plants	Ornamental & Drug Plants
17	Plant Pathology & Bacteriology	a. Plant Pathology, Botany, & Diseases of Miscellaneous Crops b. Diseases of Field Crops c. Diseases of Fruit Crops d. Diseases of Vegetable Crops
18	Plant Physiology & Nutrition	Plant Physiology & Nutrition
19	Poultry Industry	Poultry Industry
20	Rural Sociology	Rural Life Studies
21	Soils	a. Soil Chemistry & Microbiology b. Soil Fertility, Management & Soil-Plant Relationships c. Soil Physical Properties, Conservation & Classification
22	Vegetables	a. Vegetable Crops b. Potatoes
23	Veterinary Science	Veterinary Science
24	Weeds	Weed Control